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Formulation and Evaluation of Herbal Perfume

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Abstract: *The development of herbal perfumes represents a sustainable and eco- friendly approach to personal care, emphasizing the use of natural ingredients to replace synthetic chemicals. This study focuses on the formulation and evaluation of a herbal perfume derived from essential oils and botanical extracts with fragrant, therapeutic, and skin-friendly properties and to create a safe, effective, and long-lasting perfume using natural ingredients such as lavender rose, jasmine, sandalwood, and citrus oils, combined with natural fixatives like benzoin resin and base alcohol derived from plant sources. The formulation process involved selecting and blending essential oils to achieve an appealing and harmonious fragrance profile, followed by stability testing for longevity and compatibility.*

Keywords: herbal perfume, essential oils, extraction, distillation, Maceration, Enfleurage method

I. MATERIALS REQUIRED

A retort stand, 500ml Separation funnel, 250ml and 100ml Beakers, Electronics weighting balance (V 100), Water bath (DC 1000), Mortar and pestle, 500ml Round bottom flask, Knife, Aluminum foil, Electric heater, Distilled water, N-hexane, Ethanol, Olive oil, Almond oil, Jasmine oil, Lilly oil, Ylang ylang oil, Bergamot oil, Vitamin E oil, ethanol.

II. METHODOLOGY

Procedure for solvent extraction method :

130g of the dry sample of Agave amica were weighed from the sliced Agave amica sample and placed in a 500ml clean flat bottom flask. 600ml of N-hexane solvent were poured into the 500ml flask and stopped. The flask and content were allowed to stand for 24hrs; this was done to extract all the oil content in the Agava amica and for complete extraction. After which the extract was decanted into another 500ml beaker. 200ml of Ethanol were added to extract the essential oil since essential oil is soluble in Ethanol. The mixture was then transferred to 500ml separating funnel and separated by a process called liquid/liquid separation process. The content of the separating funnel was and allowed to come to equilibrium, which separated into two layers (depending on their different density). The lower Ethanol extract and the upper Hexane layer were collected into two separate 250ml beaker and were placed in a water bath at 78oC. This was done to remove the Ethanol leaving only the natural essential oil. The yield of oil was determined by weighing the extract on an electronic weighing balance. The difference between the final weight of the beaker with extract and the initial weight of the empty beaker gave the weight of essential oil.

Procedure for Enfleurage method:

130g of the dry sample of Agave amica were weighed out and pounded with mortar and pestle (to reveal the tighter inner stem). The pounded sample was then placed in a 500ml beaker. About 70ml of light-flavored olive oil were warmed and mixed with the mashed Agave amica (to allow for efficient absorption of the essential oil). The beaker was covered with aluminum foil and shaken until the lemongrass was distributed throughout the oil. It was then allowed to stand for 24hours at room temperature for proper absorption. 140ml Ethanol were added to absorb the essential oil leaving behind the light-flavored olive oil and the Agave amica residue. The Ethanol extract was decanted and placed on a water bath at 78oC to vaporize the Ethanol leaving behind the essential oil. The yield of oil was determined by weighing on an electronic weighing balance. The difference between the final weight of the beaker and the initial weight gave the yield of essential oil.

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Hydro distillation method:

130g of fresh lemongrass sample were placed into a 500ml round bottom flask containing 250ml of distilled water. The flask was fitted with a rubber stopper connected to a condenser and heated. Water at 00C flowed counter currently through the condenser to condense the ensuring steam. When the water reached 100oC it started boiling ripping off the essential oil from the lemongrass. When the lemongrass got heated up, the essential oil that was extracted from the leaf mixed with the water vapour. Both passed through the condenser and the vapour was condensed into liquid. With the use of ice block, cooling was made possible and volatilization of the essential oil was avoided. The condensate was directly collected using a 500ml beaker and then poured into a separating funnel. This formed two layers of oil and water. The tap of the separating funnel was opened to let out the water while the oil was immediately collected into a 100ml stoppered. The bottle was closed tightly to prevent vaporization of the essential oil. The oil was collected and the volume of oil obtained was weighed.

Lilly perfume preparation :

Ingredients:

Caster oil (Almond oil or jojoba oil (30ml)), Essential oils:((Lily of the valley essential oil : 10-15 drops, Jasmine essential oil : 5-10 drops, Ylang-ylang essential oil : 5 drops, Bergamot essential oil : 5 drops (for a fresh top note)), Vitamin E oil : a few drops.

Equipment :

small glass bottle or roller bottle for storage, dropper for measuring essential oils

Preparation :

First sterilize the equipment to prevent from contamination. Pour 30ml of almond oil into the glass bottle and . This will be your base. Use the dropper, add the essential oil to carrier oil. start with iliy of the valley, then add jasmine ,ylang-ylang, and bergamot . you can adjust the number of drops based on your scent preference. Cap the bottle and gently shake it to mix all the oils thoroughly. Add vitamin E oil , add few drops for preservation. Let the mixture sit in cool, dark place for at least 24 hours to a week. This allows the scents to blend and mature. After the maceration period, give the bottle a final shake before using.

Extraction Methods :

Perfume extraction method :

Fragrance extraction refers to the extraction of aromatic compounds from raw materials, using methods such as distillation, solvent extraction, expression [or enfleurage. The results of the extracts are either essential oils, absolutes, concretes, or butters, depending on the amount of waxes in the extracted product. To a certain extent, all of these techniques tend to distort the odour of the aromatic compounds obtained from the raw materials. Heat, chemical solvents, or exposure to oxygen in the extraction pr process denature the aromatic compounds, either changing their odour character or rendering them odourless.

Extraction of fragrance :

Before perfumes can be composed, the odorants used in various perfume compositions must first be obtained. Synthetic odorants are produced through organic synthesis and purified. Odorants from natural sources require the use of various methods to extract the aromatics from the raw materials. The results of the extraction are essential oils, absolutes, concretes, or butters, depending on the amount of waxes in the extracted produced. All these techniques will, to a certain extent, distort the odor of the aromatic compounds obtained from the raw materials. Maceration/Solvent extraction: This is most used and economically important technique for extracting aromatics in the modern perfume industry. Raw materials are submerged in a solvent that can dissolve the desired aromatic compounds. Maceration lasts anywhere from hours to months. Fragrant compounds form woody and fibrous plant materials are often obtained in this manner as are all aromatics from animal sources. The technique can also be used to extract odorants that are too volatile

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for distillation or easily denatured by heat. Commonly used solvents for maceration/solvent extraction include hexane, and dimethyl ether. The product of this process is called a "concrete."
Supercritical fluid extraction: A relatively new technique for extracting fragrant compounds from a raw material, which often employs Supercritical CO2. Due to the low heat of process and the relatively nonreactive solvent use in the extraction, the fragrant compounds derived often closely resemble the original odor of the raw material. Ethanol extraction: A type of solvent extraction used to extract fragrant compounds directly from dry raw materials, as well as the impure oily compounds materials resulting from solvent extraction or effleurage. Ethanol extraction is not used to extract fragrance from fresh plant materials since these contain large quantities of water, which will also be extracted into the ethanol.

Distillation :

Distillation is the process in which a liquid or vapour mixture of two or more substance is separated into its component fractions of desired purity, by the application and removal of heat. In simpler term, implies vaporizing or liberating the oils from the trichomes / plant cell membranes of the herb in presence of high temperature and moisture and then cooling the vapour mixture to separate out the oil from water. Distillation is a common technique for obtaining aromatic compounds from plants, such as orange blossoms and roses. The raw material is heated and the fragrant compounds are re-collected through condensation of the distilled vapor. Distilled products, whether through steam or dry distillation are known either as essential oils or ottos. Today, most common essential oils, such as lavender, peppermint, and eucalyptus, are distilled. Raw plant material, consisting of the flowers, leaves, wood, bark, roots, seeds, or peel, are put into an alembic (distillation apparatus) over water.

Steam Distillation :

Steam from boiling water is passed through the raw material for 60-105 minutes, which drives out most of their volatile fragrant compounds. The condensate from distillation, which contains both water and the aromatics, is settled in a Florentine flask. This allows for the easy separation of the fragrant oils from the water as the oil will float to the top of the distillate where it is removed, leaving behind the watery distillate. The water collected from the condensate, which retains some of the fragrant compounds and oils from the raw material, is called hydrosol and is sometimes sold for consumer and commercial use. This method is most commonly used for fresh plant materials such as flowers, leaves, and stems.

Enfleurage :

This is the absorption of aroma materials into solid fat or wax and extracting the odorous oil with ethyl alcohol. Extraction by enfleurage was commonly used when distillation was not possible because some fragrant compounds denature through high heat. This technique is not commonly used in the present day industry due to its prohibitive cost and the existence of more efficient and effective extraction methods. Enfleurage is a two-step process during which the odour of aromatic materials is absorbed into wax or fat, and then extracted with alcohol.

Maceration Process :

1. Selection of plant material : choosing the right plants and plant parts for the desired fragrance.
2. Preparation of plant material: cleaning, drying, and sometimes crushing or grinding the plant material .
3. Steeping: Imersing the plant material in a solvent such as ethanol or jojoba oil, to extract the essential oils and aroma compounds.
4. Waiting period: allowing the mixture to steep for a period of time , which can range from a few days to several weeks.
5. Straining and filtering: separating the liquid extract from the plant material and filtering it to remove impurities.

Evaluation :

Organoleptic evaluation : Colour, fragrance, appearance

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Physical evaluation :

pH: pH of perfume is determined by using pH paper

Spot testing: Start by choosing your one to test and then spray either your wrist or back of the hand in a downward motion. Two spritzes should do it. Drop your hand to your side and wait at least 30 seconds for the scent to settle on your skin. Once it has started to dry, bring your hand up and inhale. After testing spot test there is no spot of perfume appear.

Hedonic test: The Hedonic rating test is used to measure the consumer acceptability and preference. The panelist is asked to rate the acceptability of the product on a scale. of 9 points, ranging from "like extremely" to" dislike extremely".

Sensory test : Sensory analysis -based on the assessment of odor sensations perceived by the human sense of smell, the results of which are usually presented in the form of odor intensity, threshold concentration or odor concentration

Skin irritancy test :Skin Irritation Test (SIT) The Skin Ethic Skin irritation Test (SIT) can be used to predict the acute skin irritation potential of chemicals.

Physiochemical parameters of perfume (Table : 1):

S.No	parameters	Results
1	Colour	Reddish brown
2	fragrance	Fruity fragrance
3	Appearance	Good
4	PH	8.9
5	Skin irritancy	No skin irritation
6	Hedonic test	Pleasant

III. RESULTS AND DISSCUSSION

Solvent extraction method :

Result obtained by solvent extraction is shown in Table :2

Table:2

Weight of oil (g)	Time (min)
0.2	240
0.3	480
0.7	720
0.72	960
0.78	1200

The amount of essential oils obtained by solvent extraction method was 2.7g of essential oil per 130g of dry lemongrass sample. This gave 2.08% yield of essential oil per 130g of dry lemongrass. The temperature used was 780C i.e. the boiling point of ethanol. The volume of essential oil was measured at every 4hr interval to determine the oil yield at varying time. As the time increases the Ethanol solvent reduces thereby leaving the essential oil in the mixture.

Enfleurage extraction method (Table:3):

Table:3 results of enfleurage extraction method

Weight (g)	Time(min)
0.31	240
0.41	480
0.55	720
0.58	960
0.70	1200

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The essential oil produced by enfleurage method is 2.55g weight of essential oil per 130g of dry lemongrass sample thereby producing 1.96% oil yield at 780C.

Hydro Distillation Method (Table:4):

Table:4 Results of hydro distillation method

Weight (g)	Time(min)
0.10	240
0.14	480
0.26	720
0.35	960
0.38	1200

The result of hydro distillation process was 1.23g per 130g of lemongrass sample giving 0.95% yield of oil. Physical and Chemical Properties of lemongrass oil The essential oil produced was pale yellow, with an aromatic camphoraceous odour, pungent and cooling taste. Because of its high volatility, it was stored in an air-tight container protected from light in cool place. The essential oil is insoluble in water, miscible in alcohol and in oil.

Method of extraction % yield Solvent extraction 2.08 Enfleurage 1.96 Hydro distillation 0.95 From the experiment carried out it was observed that the best method used in extraction is solvent extraction method because it yielded more oil than any other method. This conforms to works done by other researchers.

Enfleurage method, yielded less oil when compared to the solvent extraction this could be because most volatile content gets lost during the pounding process while hydro distillation gave low yield. This could be because the extraction of the essential oil was not always complete due to variable rate of distillation cause by heat.

The physiochemical parameters of the prepared perfume were determined. The formulation exhibited good as appearance characteristics as well as the PH was found in range, 8. 9 which determined PH. Other parameters such as Hedonic test, sensory test, spot test were determined.

IV. CONCLUSION

Solvent extraction, enfleurage and hydro distillation methods are effective and efficient means of extracting essential oils. Solvent extraction is the most common and most economically technique for extracting oil in modern perfume industry because of its simplicity. Extraction by enfleurage was commonly used when distillation was not possible because some fragrant compounds denature through high heat. This technique is not commonly used in modern industries because of its prohitive cost. The essential oil extracted by hydro distillation has strong odor characteristics of the raw material from which they were produced. When compared with other methods of extraction. It is cheaper because the cost involved is that of energy used in heating water to generate steam. Water itself is the commonest material easily available from nature supply or other alternative sources. There is high demand for essential oils for various purposes such as medicinal, perfumery, soap making, in sectides to mention but a few. Imported essential oils are very expensive to meet the demand of our local consumer industries, therefore it becomes necessary to source and synthesis these oils from local sources, in particular lemon grass. With essential oils made from lemon grass, perfume can be produced locally using different methods of extraction, thereby creating employment.

This research indicates the importance of flowers as sources of aromatic compound for the Preparation of local perfumes, and their role to improve the live hood of growers. This Is an attempt To explore the possibility of perfume manufacturing using flowers. The flowers essential oil was Successfully extracted from dry petals of flowers using solvent extraction or maceration Although solvent extraction method gives higher result. The essential oil was used successfully in perfume formulation by using fixating and different solvents (alcohol) as ingredients.

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